O-03

Scanning probe microscopy under ultra high vacuum: Technologies and advantages from Scienta Omicron

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The goal of the talk is to introduce the Fermi DryCool™ SPM combining a cryogen-Free cooling system with a state-of-the art SPM head for high resolution STM and QPlus imaging, and spectroscopy in UHV for extended operations at low (<10K) temperatures.

The Fermi DryCool™ SPM combines a cryogen-Free cooling system with a state-of-the art SPM head for high resolution STM and QPlus imaging and spectroscopy in UHV for extended operations at low (<10K) and variable temperatures.

The unique DryCool™ technology integrates a closed-cycle, cryo-free cooling element to the SPM, while simultaneously decoupling the mechanical and acoustic impact. The result is a scanned probe system that performs measurements with extremely low drift and picometer stability, providing an excellent platform for long-term experiments such as scanning tunneling spectroscopy (STS), inelastic tunneling spectroscopy (IETS), and atomic manipulations.

A special design enables operation anywhere in the temperature range from below 10K up to 400K, with the unique feature of independent temperature control of the tip and the sample. This approach paves the way for scientists to continuously perform low and variable temperature STM, STS and Q-plus nc-AFM experiments.

The low thermal, mechanical and acoustic noise of the DryCool™ technology results in a stability level comparable to SPM's using conventional cooling techniques. The superior drift performance in XYZ dimensions (<0.2 Å/h) provides an ideal platform for long-term spectroscopy experiments (Fig. 1).

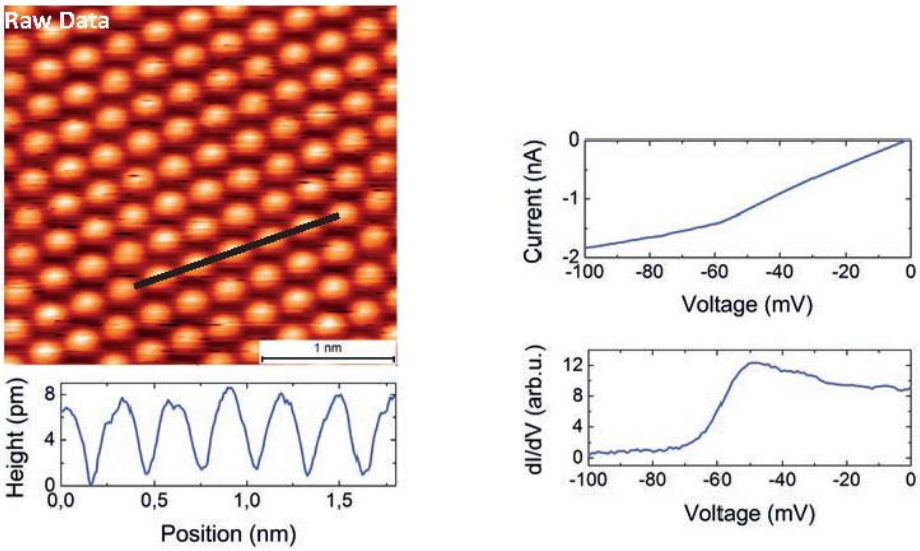

Figure 1. Atomic STM measurement with corresponding line profile along the black line-section, and high resolution scanning tunneling spectroscopy on Ag(111) at T=9.8K with running cooler.